Buying Energy Efficient Products

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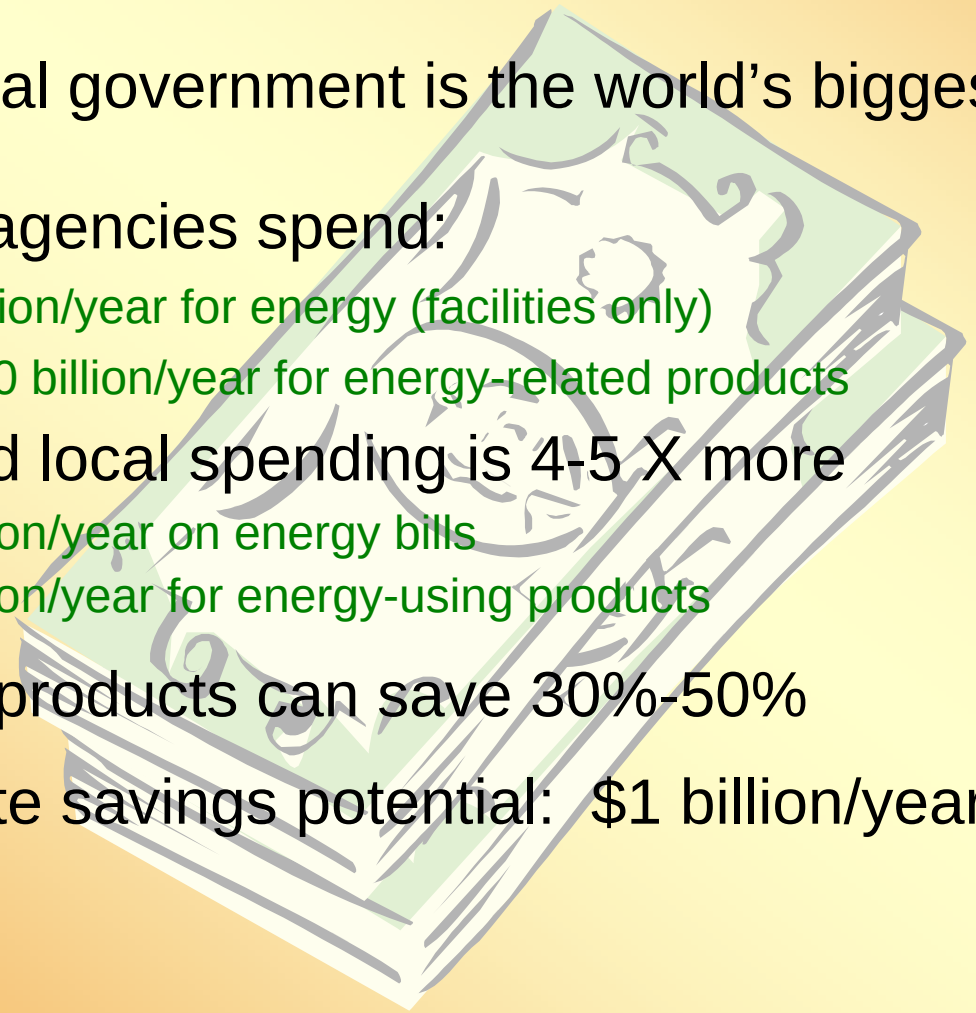
DOE
Federal Energy Management Program

Overview of Presentation

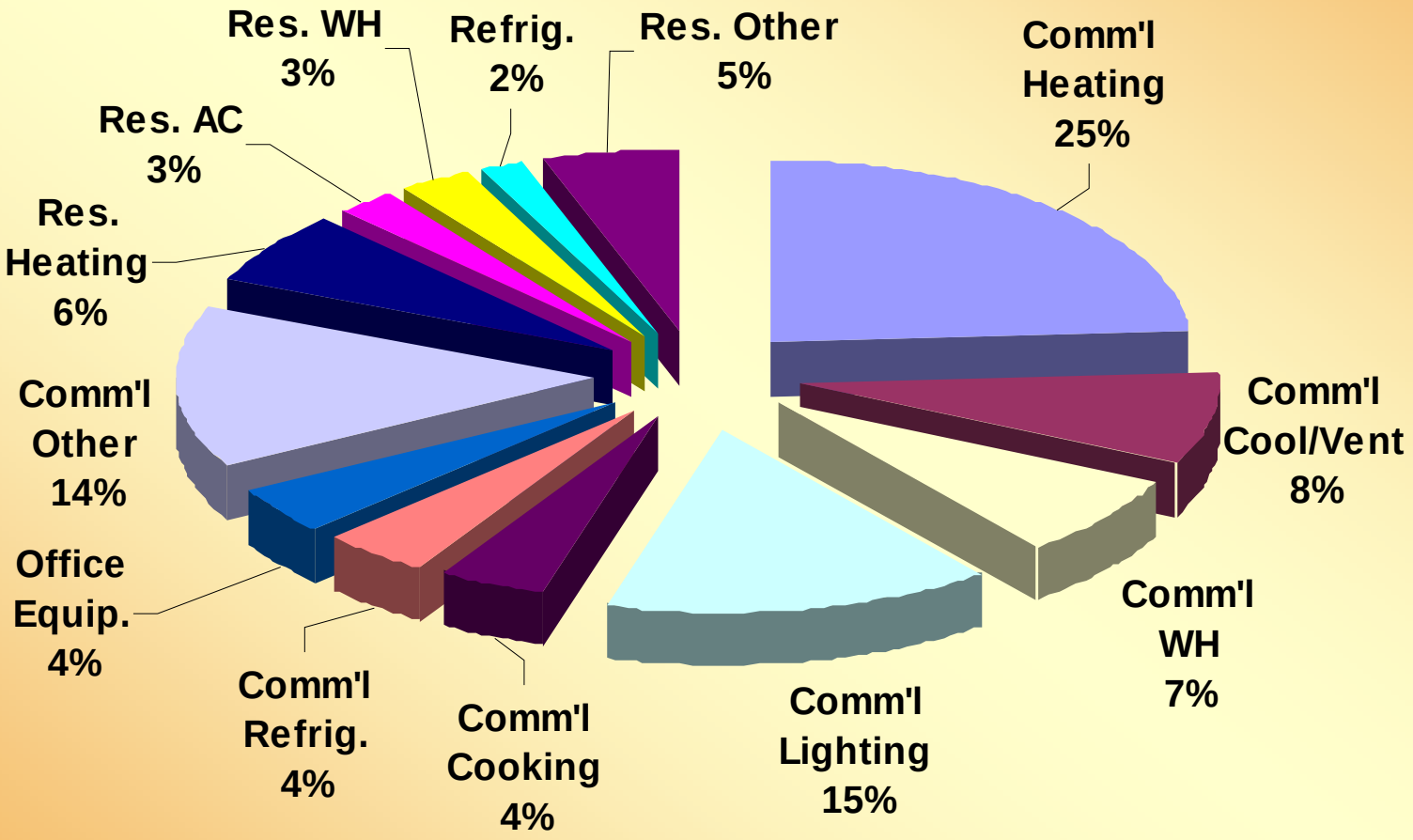
- Federal Purchasing Background & Statistics
- Federal Purchasing Requirements
- How to Buy & Save with Efficient Products
  - FEMP Procurement Recommendations
  - FEMP Low Standby Recommendations
  - Individual Agency Policies

Economic Significance



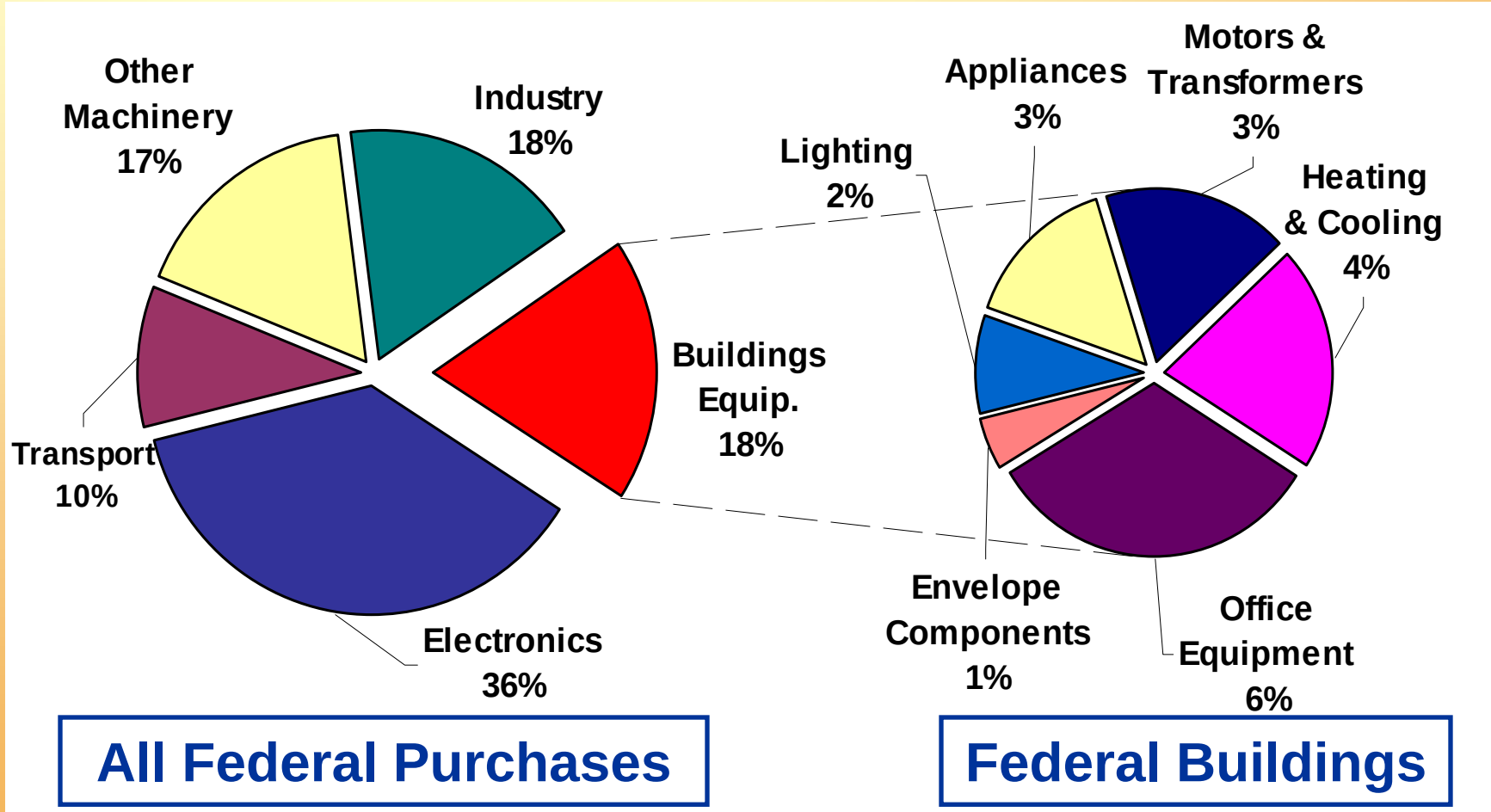
- US federal government is the world's biggest buyer
- Federal agencies spend:
  - $3.5 billion/year for energy (facilities only)
  - over $10 billion/year for energy-related products
- State and local spending is 4-5 X more
  - $12 billion/year on energy bills
  - $50 billion/year for energy-using products
- Efficient products can save 30%-50%
- Aggregate savings potential: $1 billion/year

How is Energy Used in Federal Buildings?



(First End-Use Estimate, Adapted from CBECS)

Estimated Federal Purchases of Energy-Related Products



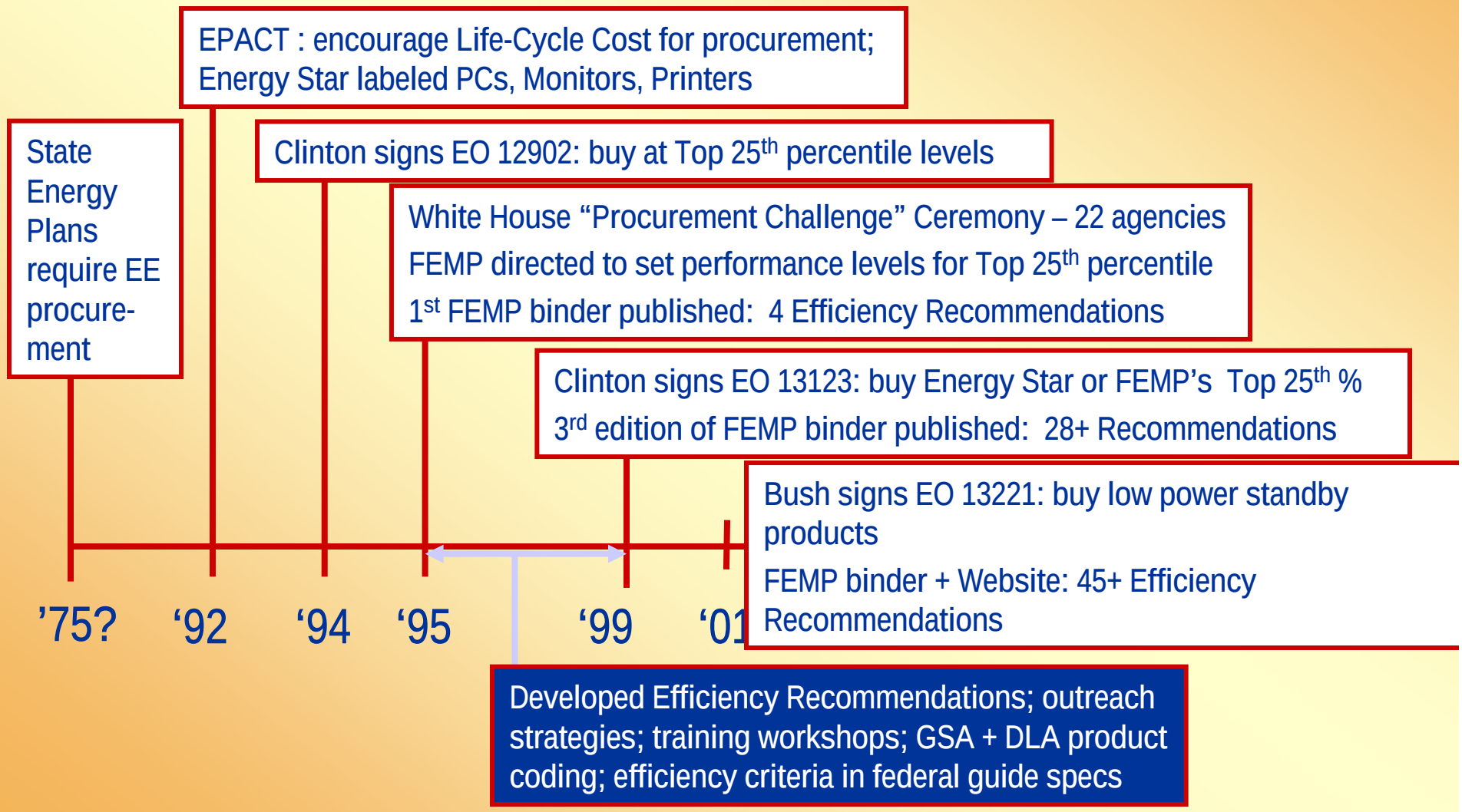
Why Buy Energy Efficient Products?

- Save energy and money ...

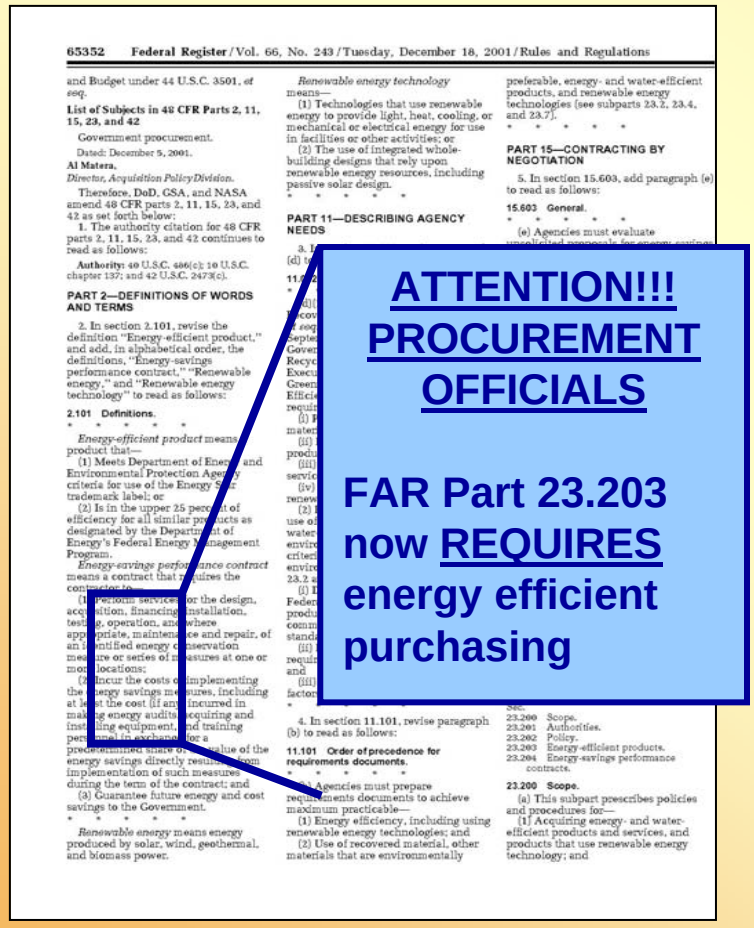
  … using funds *already budgeted* for normal equipment purchase, replacement

- Market leadership
  - aggregate buyer demand for efficient products
  - expand product offerings at competitive prices
- Reduce air pollution + CO_2 emissions
- Energy-efficient ⇔ “green” purchasing

Federal E.E. Purchasing Policy: A Brief History



Federal Purchasing Policies



65352 Federal Register / Vol. 66, No. 243 / Tuesday, December 18, 2001 / Rules and Regulations

and Budget under 44 U.S.C. 3501, *et seq.*

List of Subjects in 48 CFR Parts 2, 11, 15, 23, and 42

Government procurement.

Dated: December 5, 2001.

Al Matera,

Director, Acquisition Policy Division.

Therefore, DoD, GSA, and NASA amend 48 CFR parts 2, 11, 15, 23, and 42 as set forth below:

1. The authority citation for 48 CFR parts 2, 11, 15, 23, and 42 continues to read as follows:

Authority: 40 U.S.C. 486(c); 10 U.S.C. chapter 137; and 42 U.S.C. 2473(c).

PART 2—DEFINITIONS OF WORDS AND TERMS

2. In section 2.101, revise the definition "Energy-efficient product," and add, in alphabetical order, the definitions, "Energy-savings performance contract," "Renewable energy," and "Renewable energy technology" to read as follows:

2.101 Definitions.

* * * * *

Energy-efficient product means a product that—

(1) Meets Department of Energy and Environmental Protection Agency criteria for use of the Energy Star trademark label; or

(2) Is in the upper 25 percent of efficiency for all similar products as designated by the Department of Energy's Federal Energy Management Program.

Energy-savings performance contract means a contract that requires the contractor to—

(1) Perform services for the design, acquisition, financing, installation, testing, operation, and, where appropriate, maintenance and repair, of an identified energy conservation measure or series of measures at one or more locations;

(2) Incur the costs of implementing the energy savings measures, including at least the cost (if any) incurred in making energy audits, acquiring and installing equipment, and training personnel in exchange for a predetermined percentage of the value of the energy savings directly resulting from implementation of such measures during the term of the contract; and

(3) Guarantee future energy and cost savings to the Government.

* * * * *

Renewable energy means energy produced by solar, wind, geothermal, and biomass power.

Renewable energy technology means—

(1) Technologies that use renewable energy to provide light, heat, cooling, or mechanical or electrical energy for use in facilities or other activities; or

(2) The use of integrated whole-building designs that rely upon renewable energy resources, including passive solar design.

* * * * *

PART 11—DESCRIBING AGENCY NEEDS

3. In section 11.002, revise paragraph (d) to read as follows:

4. In section 11.101, revise paragraph (b) to read as follows:

11.101 Order of precedence for requirements documents.

* * * * *

(b) Agencies must prepare requirements documents to achieve maximum practicable—

(1) Energy efficiency, including using renewable energy technologies; and

(2) Use of recovered material, other materials that are environmentally preferable, energy- and water-efficient products, and renewable energy technologies (see subparts 23.2, 23.4, and 23.7).

* * * * *

PART 15—CONTRACTING BY NEGOTIATION

5. In section 15.603, add paragraph (e) to read as follows:

15.603 General.

* * * * *

(e) Agencies must evaluate

Sec.

23.200 Scope.

23.201 Authorities.

23.202 Policy.

23.203 Energy-efficient products.

23.204 Energy-savings performance contracts.

23.200 Scope.

(a) This subpart prescribes policies and procedures for—

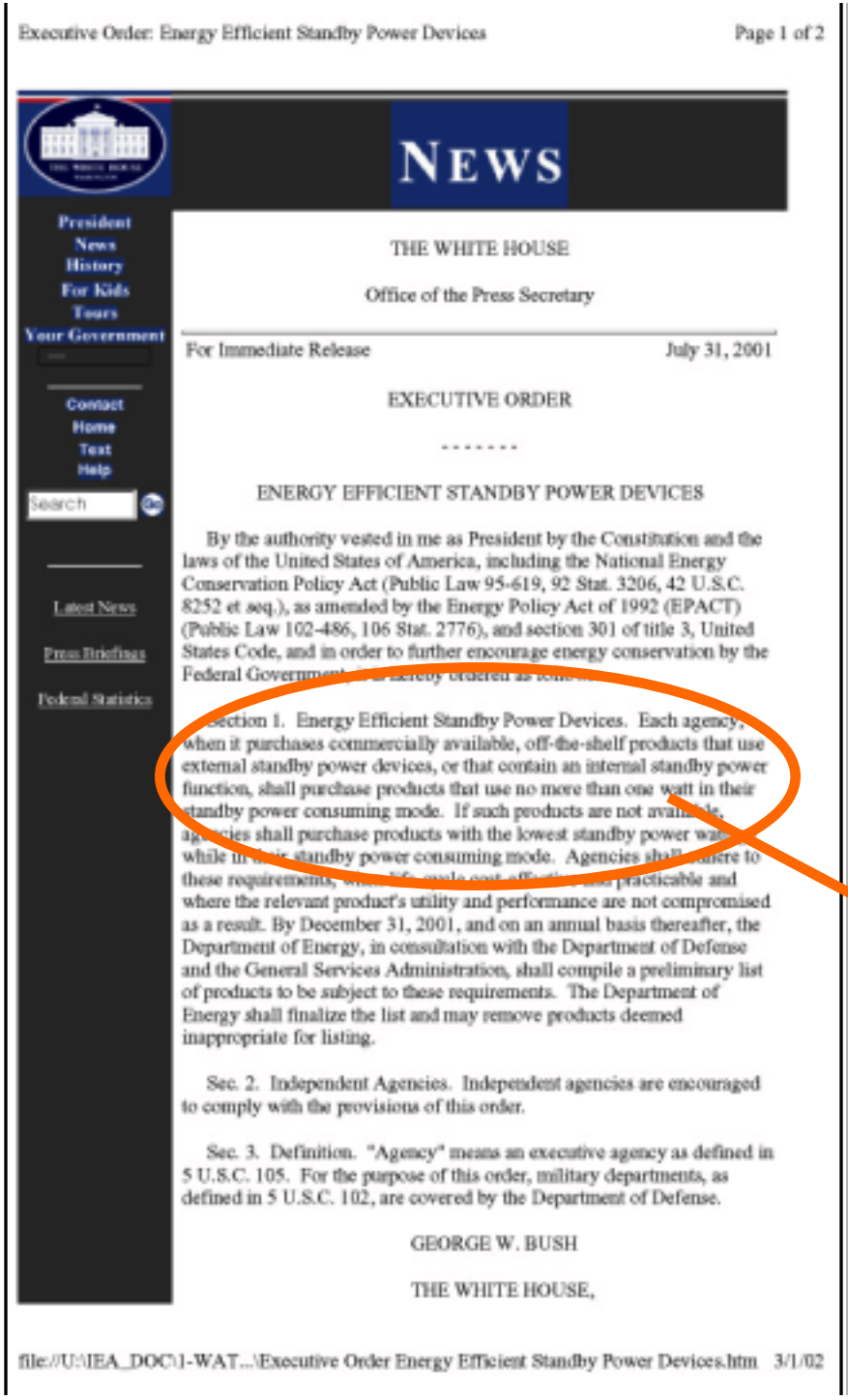
(1) Acquiring energy- and water-efficient products and services, and products that use renewable energy technology; and

ATTENTION!!! PROCUREMENT OFFICIALS

FAR Part 23.203 now REQUIRES energy efficient purchasing

- Agencies shall select, where life-cycle cost-effective, ENERGY STAR® and other ...products in the upper 25 percent of energy efficiency as designated by FEMP. " Executive Order 13123, Sec. 403(b)

- Agencies shall purchase ENERGY STAR® or other energy-efficient items listed on the Department of Energy's Federal Energy Management Program (FEMP) Product Energy Efficiency Recommendations product list; and ... items which meet FEMP's standby power wattage recommendation or document the reason for not purchasing such items." FAR 23203(a)



Executive Order: Energy Efficient Standby Power Devices Page 1 of 2

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THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release July 31, 2001

EXECUTIVE ORDER

- - - - - - -

ENERGY EFFICIENT STANDBY POWER DEVICES

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Energy Conservation Policy Act (Public Law 95-619, 92 Stat. 3206, 42 U.S.C. 8252 et seq.), as amended by the Energy Policy Act of 1992 (EPACT) (Public Law 102-486, 106 Stat. 2776), and section 301 of title 3, United States Code, and in order to further encourage energy conservation by the Federal Government [illegible] hereby ordered as follows:

Section 1. Energy Efficient Standby Power Devices. Each agency, when it purchases commercially available, off-the-shelf products that use external standby power devices, or that contain an internal standby power function, shall purchase products that use no more than one watt in their standby power consuming mode. If such products are not available, agencies shall purchase products with the lowest standby power watt while in their standby power consuming mode. Agencies shall adhere to these requirements, where life-cycle cost-effective, practicable and where the relevant product's utility and performance are not compromised as a result. By December 31, 2001, and on an annual basis thereafter, the Department of Energy, in consultation with the Department of Defense and the General Services Administration, shall compile a preliminary list of products to be subject to these requirements. The Department of Energy shall finalize the list and may remove products deemed inappropriate for listing.

Sec. 2. Independent Agencies. Independent agencies are encouraged to comply with the provisions of this order.

Sec. 3. Definition. "Agency" means an executive agency as defined in 5 U.S.C. 105. For the purpose of this order, military departments, as defined in 5 U.S.C. 102, are covered by the Department of Defense.

GEORGE W. BUSH

THE WHITE HOUSE,

file://U:\IEA_DOC\1-WAT...\Executive Order Energy Efficient Standby Power Devices.htm 3/1/02

2004 Energy

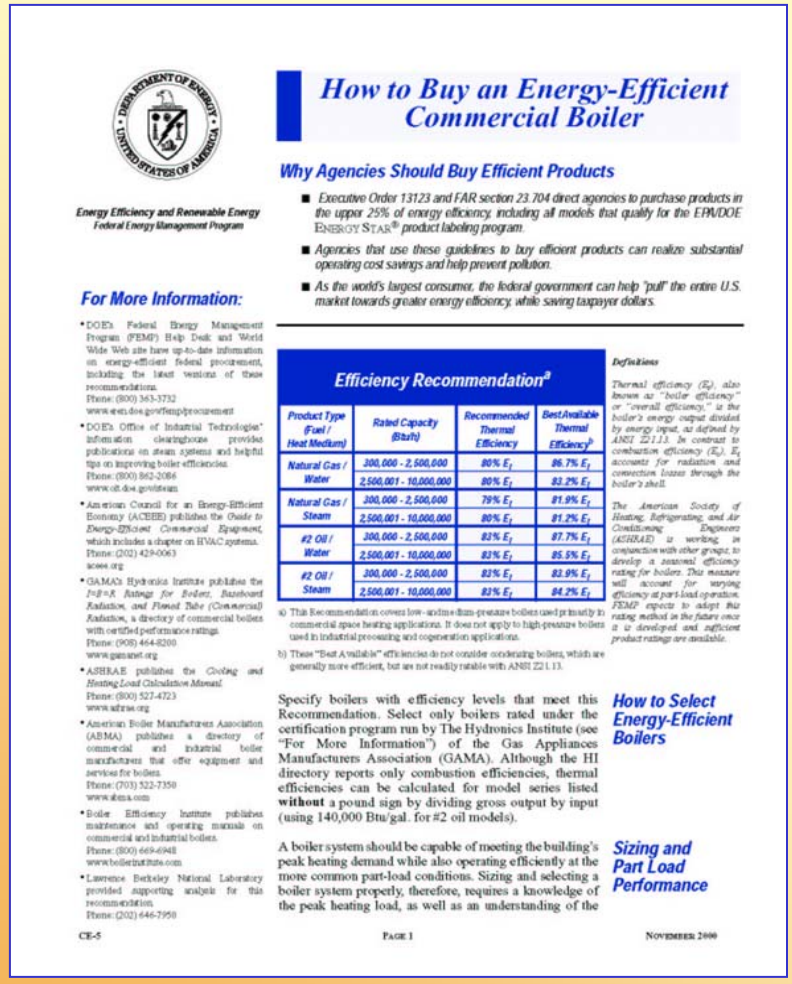
July 2001
Executive Order 13221 on Standby Power

"…Each agency… shall purchase products that use no more than one watt in their standby power consuming mode… where cost effective…"

Product Energy Efficiency Recommendations

- More than 45 Products Covered
- Office Equipment
- Residential Appliances & Equipment
- Commercial Appliances & Equipment
- Lighting Technologies
- Construction Products
- Water Using Technologies

"Making it Easy" for Federal Buyers (and anyone else!)



Energy Efficiency and Renewable Energy
Federal Energy Management Program

How to Buy an Energy-Efficient Commercial Boiler

Why Agencies Should Buy Efficient Products

- Executive Order 13123 and FAR section 23.704 direct agencies to purchase products in the upper 25% of energy efficiency, including all models that qualify for the EPA/DOE ENERGY STAR® product labeling program.
- Agencies that use these guidelines to buy efficient products can realize substantial operating cost savings and help prevent pollution.
- As the world's largest consumer, the federal government can help "pull" the entire U.S. market towards greater energy efficiency, while saving taxpayer dollars.

For More Information:

- DOE's Federal Energy Management Program (FEMP) Help Desk and World Wide Web site have up-to-date information on energy-efficient federal procurement, including the latest versions of these recommendations.
  Phone: (800) 363-3732
  www.eren.doe.gov/femp/procurement
- DOE's Office of Industrial Technologies' information clearinghouse provides publications on steam systems and helpful tips on improving boiler efficiencies.
  Phone: (800) 862-2086
  www.oit.doe.gov/steam
- American Council for an Energy-Efficient Economy (ACEEE) publishes the *Guide to Energy-Efficient Commercial Equipment*, which includes a chapter on HVAC systems.
  Phone: (202) 429-0063
  aceee.org
- GAMA's Hydronics Institute publishes the *I=B=R Ratings for Boilers, Baseboard Radiation, and Finned Tube (Commercial) Radiation*, a directory of commercial boilers with certified performance ratings.
  Phone: (908) 464-8200
  www.gamanet.org
- ASHRAE publishes the *Cooling and Heating Load Calculation Manual*.
  Phone: (800) 527-4723
  www.ashrae.org
- American Boiler Manufacturers Association (ABMA) publishes a directory of commercial and industrial boiler manufacturers that offer equipment and services for boilers.
  Phone: (703) 522-7350
  www.abma.com
- Boiler Efficiency Institute publishes maintenance and operating manuals on commercial and industrial boilers.
  Phone: (800) 669-6948
  www.boilerinstitute.com
- Lawrence Berkeley National Laboratory provided supporting analysis for this recommendation.
  Phone: (202) 646-7950

Efficiency Recommendation[a]

Product Type (Fuel / Heat Medium)	Rated Capacity (Btu/h)	Recommended Thermal Efficiency	Best Available Thermal Efficiency[b]
Natural Gas / Water	300,000 - 2,500,000	80% E_t	86.7% E_t
	2,500,001 - 10,000,000	80% E_t	83.2% E_t
Natural Gas / Steam	300,000 - 2,500,000	79% E_t	81.9% E_t
	2,500,001 - 10,000,000	80% E_t	81.2% E_t
#2 Oil / Water	300,000 - 2,500,000	83% E_t	87.7% E_t
	2,500,001 - 10,000,000	83% E_t	85.5% E_t
#2 Oil / Steam	300,000 - 2,500,000	82% E_t	83.9% E_t
	2,500,001 - 10,000,000	83% E_t	84.2% E_t

a) This Recommendation covers low- and medium-pressure boilers used primarily in commercial space heating applications. It does not apply to high-pressure boilers used in industrial processing and cogeneration applications.

b) These "Best Available" efficiencies do not consider condensing boilers, which are generally more efficient, but are not readily ratable with ANSI Z21.13.

Definitions

Thermal efficiency (E_t), also known as "boiler efficiency" or "overall efficiency," is the boiler's energy output divided by energy input, as defined by ANSI Z21.13. In contrast to combustion efficiency (E_c), E_t accounts for radiation and convection losses through the boiler's shell.

The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) is working in conjunction with other groups to develop a seasonal efficiency rating for boilers. This measure will account for varying efficiency at part-load operation. FEMP expects to adopt this rating method in the future once it is developed and sufficient product ratings are available.

Specify boilers with efficiency levels that meet this Recommendation. Select only boilers rated under the certification program run by The Hydronics Institute (see "For More Information") of the Gas Appliances Manufacturers Association (GAMA). Although the HI directory reports only combustion efficiencies, thermal efficiencies can be calculated for model series listed **without** a pound sign by dividing gross output by input (using 140,000 Btu/gal. for #2 oil models).

How to Select Energy-Efficient Boilers

A boiler system should be capable of meeting the building's peak heating demand while also operating efficiently at the more common part-load conditions. Sizing and selecting a boiler system properly, therefore, requires a knowledge of the peak heating load, as well as an understanding of the

Sizing and Part Load Performance

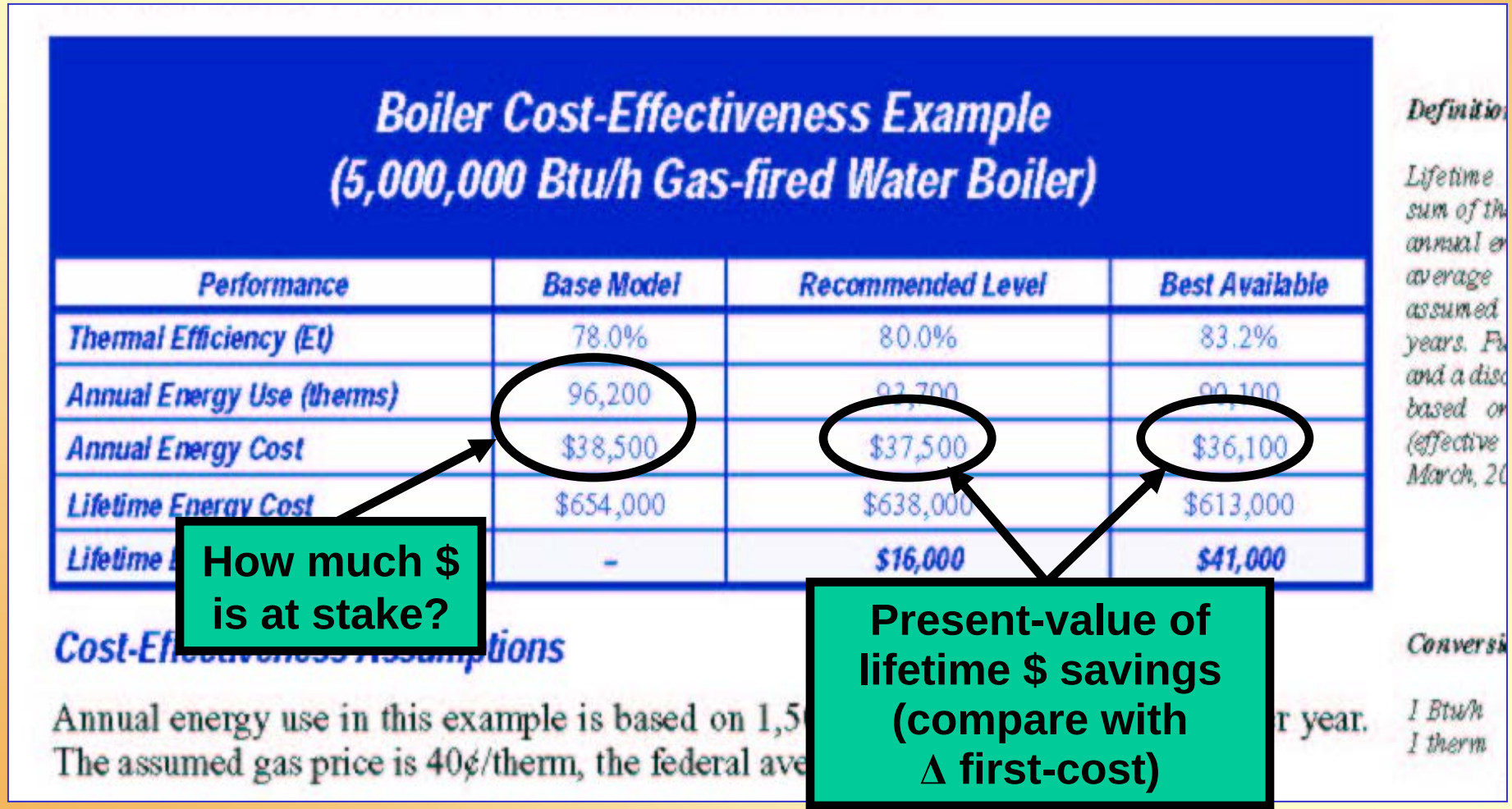
CE-5 PAGE 1 NOVEMBER 2000

FEMP Purchasing Recommendations

- ✓ Identifies performance levels
- ✓ Applies simple criteria:
  - Top 25 percentile of market
    and/or
  - Energy Star label
- ✓ Provides cost-effectiveness example
- ✓ Lists federal supply sources
- ✓ Calculates cost effectiveness
- ✓ Includes installation and operating tips
- ✓ Available in hard-copy + on line:

www.eere.energy.gov.gov/femp/procurement

Simplify Life-Cycle Cost Decisions for Buyers



Boiler Cost-Effectiveness Example
(5,000,000 Btu/h Gas-fired Water Boiler)

Performance	Base Model	Recommended Level	Best Available
Thermal Efficiency (Et)	78.0%	80.0%	83.2%
Annual Energy Use (therms)	96,200	93,700	90,100
Annual Energy Cost	$38,500	$37,500	$36,100
Lifetime Energy Cost	$654,000	$638,000	$613,000
Lifetime	-	$16,000	$41,000

How much $ is at stake?

Present-value of lifetime $ savings (compare with Δ first-cost)

Annual energy use in this example is based on 1,5 r year.
The assumed gas price is 40¢/therm, the federal ave

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March, 20

Conversi
1 Btu/h
1 therm

On-Line Cost Savings Calculators

http://www.eren.doe.gov/femp/procurement/calc-index.html

FEMP's ENERGY COST CALCULATOR FOR COMMERCIAL BOILERS (Closed Loop, Space Heating Applications Only)

Vary equipment size, energy cost, hours of operation, and /or efficiency level.

INPUT SECTION

Input the following data (If any parameter is missing, calculator will set to default value).		*Defaults*
Project Type	New Installation	*New Installation*
Deliverable Fluid	Water	*Water*
Fuel Used	No. 2 oil	*Gas*
Existing Capacity *	MBtu/h	—
Existing Thermal Efficiency *	% Et	—
New Capacity	5000 MBtu/h**	*5000 MBtu/h*
New Thermal Efficiency	80 % Et	*80% Et*
Energy Cost	$ .80 per gallons	*$0.40 per therm*
Quantity of Boilers to be Purchased	1 unit(s)	*1 unit*
Annual Hours of Operation***	1500 hours	*1500 hours*

* Existing values should only be entered when Project Type is a replacement.
** 1 MBtu/h = 1000 Btu/h; 1 Therm = 100,000 Btu; 1.4 Therms = 140,000 Btu
*** Value entered should be equivalent full load hours (e.g., 1000 hours @ 50% load equals 500 hours).

Calculate Reset

Cost Savings Calculators (continued)

Calculate Reset

OUTPUT SECTION

Performance per Boiler	Your Choice	Existing Boiler	Base Model	FEMP Recommended Level	Best Available
Thermal Efficiency	80 Et		78	83	85.5
Annual Energy Use gallons	66964		68681	64543	62656
Annual Energy Costs	$ 53571	$	$ 54944	$ 51634	$ 50124
Lifetime Energy Costs	$ 1200526	$	$ 1231295	$ 1157117	$ 1123278
Lifetime Energy Cost Savings	$ 30769	$	$ 0	$ 74178	$ 108017
Lifetime Energy Cost Savings for 1 Boiler(s)	$ 30769	$	$ 0	$ 74178	$ 108017

Your selection of a 5000 MBtu/h water boiler will have an energy cost savings of $ 30769 over an estimated life of 25 years as compared to the base model.

Assumptions

- $0.06/kWh is the federal average electricity price in the U.S
- $0.04/therm is the federal average gas price in the U.S
- $0.66/gallon is the federal average fuel oil price in the U.S.
- Future electricity price trends and a discount rate of 3.1% are based on federal guidelines.
- Lifetime energy cost is the sum of the discounted value of annual energy costs based on an assumed boiler life of 25 years.
- The average heating value for No. 2 oil is 140,000 Btu/gallon.

Overcome first-cost bias

Life-cycle Cost Example: Rooftop Air Conditioner

- **Energy Savings:**
  3,800 kWh/year
- **Energy Cost Savings:**
  $220/year
- **Lifetime Energy Cost Savings: $2,200**
  - **Using NIST 2003 Discount Rate of 3.3%**
- **Estimated Cost Increase: $700 to $750**
- **Payback: Approximately 3 years**
- **Lifetime CO_2 savings = 8 cars driving for one year**

Lowering Standby Power

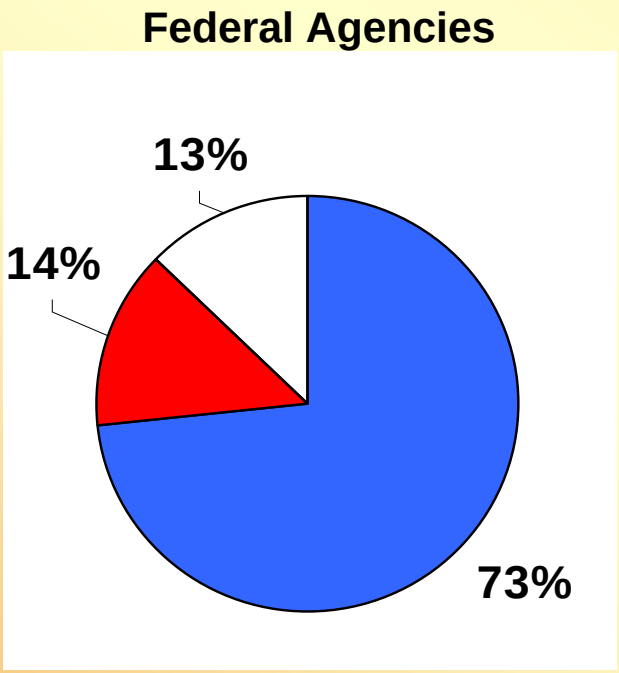
- What is it?
  - The electricity used when a device is turned off or not performing its primary purpose.
- Why is this an issue?
  - Number of devices which use standby power is growing rapidly
  - Each device consumes 1 to 40 watts
  - Estimated at 70 watts per home
  - Accounts for 600 kWh/year or 3% of a household's electricity use

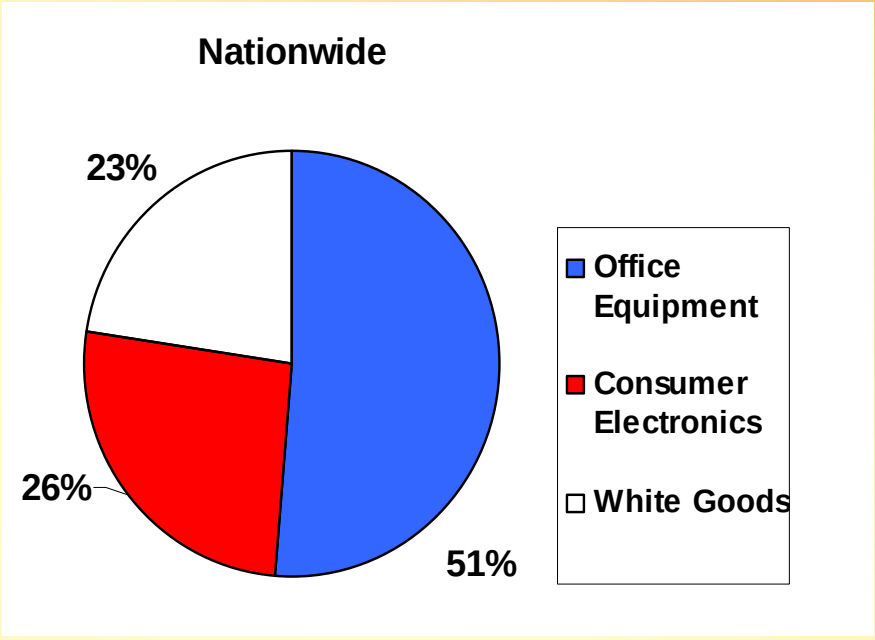
Products Covered by FEMP Low-Standby Recommendations

- Consumer electronics
  - **TV, VCR, TV-VCR combo, audio**
- Office Equipment
  - **Desktop PC, laptop, monitor, printer, copier, fax, multifunction, scanner**
- White Goods*
  - **Microwave**
- http://oahu.lbl.gov

*** New dishwasher test method and label will include standby in annual energy consumption.**

Savings from Low-Standby*





Federal government agencies

- 230 GWh/year; $14 million annually
- enough electricity to serve ~20,000 homes

Nationally

- 4000 GWh/year; $300 million annually
- enough electricity to serve ~350,000 homes

* After 5 years

When & How to Buy Energy Efficient Products

When…

- ✓ Buying new equipment
- ✓ Replacing old equipment
- ✓ Consider early replacement

How…

- ✓ Look for the ENERGY STAR label
- ✓ Compare energy use from EnergyGuide label to FEMP's *Recommendation*
- ✓ Get energy use data from manufacturer and compare to *Recommendation*

Making Energy Efficiency Your Agency's Default Choice

Organization	Products covered in guide spec	Est. annual savings from one year's installations	Est. annual savings in 2010 from ten years' installations	Est. cumulative savings by 2010 from ten years' installations
U.S. Army Corps of Engineers	Water-cooled electric chillers	$750,000	$7,500,000	$41,250,000
U.S. Navy	Liquid-filled distribution transformers	$750,000	$7,500,000	$41,250,000
State of Wisconsin	Distribution transformers, electric motors	$80,000	$800,000	$4,400,000
Arcom (MASTERSPEC®)	Water-cooled electric chillers	$1,500,000	$15,000,000	$82,500,000

Source: Coleman, ACEEE-2000

NAVFAC Example

Appendix G – Technical Evaluation Manual NAVFACINST. 11101.85H Navy Housing Project Standards

1.1 MAJOR APPLIANCE

The Contractor shall provide the following Energy Star labeled equipment in accordance with specifications listed, one each per dwelling unit: [Note: All replacement appliances shall be Energy Star labeled.]

1.1.1 Refrigerator

Refrigerators shall conform to UL250, two-door, top-mounted frost-free freezer type, with adjustable shelves, separate refrigerator and freezer temperature controls, energy savings switch, separate meat tender and vegetable crispers, and four rollers. [Icemakers are desirable.] Models with ice through the door are prohibited. Minimum refrigerator size shall be 20 Cu. Ft. (nominal size) and consume not more than 590 kwh/year.

Make Efficiency the Norm

- Require energy efficient products in:
  - Your agency's guide specifications
  - Project specifications for building construction or renovation
  - Service and maintenance contracts
  - Use “drop-in” language
- New rule of thumb:

  “*Buy the efficient product unless you can show that a less efficient product is cheaper on a life-cycle basis!*”

How Can You Find Out More?

- Call our hotline at (800)363-3732
- Visit these web sites
  - http://www.eere.energy.gov/femp/technologies/eeproducts.cfm
  - www.energystar.gov/products
  - http://www.eere.energy.gov/femp/technologies/eep_standby_power.cfm